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Preface

Textile industry is one of the largest and most important sectors in the Indian economy in terms of output, foreign exchange earnings and employment. The share of Indian textile industry is very high in the textile industry of world. It contributes approximately 14% to India's industrial production, 4% to the GDP and 17% to the country's export earnings. More prominently, it is responsible for 20 percent of the manufacturing value addition. Lately, it has been bringing home one-third of India`s total export earnings. It provides direct employment to over 35 million people and it generates second largest employment after the agricultural sector. This industry is expected to grow to US $ 110 billion by 2015 from its present value US $ 70 billion. Indian textile and apparel industry is taking a new course by entering the Chinese market. Most of the top global apparel retailers, such as JC Penny, Nautica, Docker and Target, have their sourcing network in India. Indian textiles and apparel exports, which is worth US $ 22 billion is expected to register a four-fold increase to touch US $ 90 to 100 billion in the next 25 years. Cotton is the most famous textile material associated with the Indian Subcontinent. Cotton is soft and comfortable. It absorbs perspiration. It has good color retention. It is a good material for printing. The export of fast dyed cotton cloth to Europe revolutionised the garment and furnishing fashions, agricultural practices and the textile manufacturing industries of the seventeenth and eighteenth centuries. In addition to the textile industry, cotton is used in fishnets, coffee filters, tents and in bookbinding. The first Chinese paper was made of cotton fiber, as is the modern US dollar bill and federal stationery. Before economic liberalization 1991, Indian cotton industry was in miserable situation. Economic liberalization of Indian economy in 1991 gave much-needed thrust to the Indian cotton textile industry.

Outline of the research

The present study is divided into five chapters.

The **first chapter** is introductory in nature. It provides the history of cotton and its importance in Indian economy. It describes all the sector of cotton industry like raw cotton, spinning, weaving, processing, garment and home furnishing, value addition. The chapter gives a clear picture of present scenario of cotton industry and its place in textile industry. It also deals with the objectives and limitations of the study.

The **second chapter** deals with the brief studies made by different authors which inspired the present study. This chapter is review of literature.

Third chapter is allotted to research methodology where methods of data collection, its sources, study period and statistical tools used for analysis have been described.

The **fourth chapter** is devoted to result and discussion part where production and marketing trend of different sector of cotton textile starting from raw cotton to garment/home furnishing to value addition and its future trend and scope have been analyzed using statistical tools and result is discussed.

The **fifth chapter** is assigned to conclusion and recommendation for future works in the cotton textile industry.

Chapter 1

Introduction

1.1 History of Cotton

"White Gold" is a historical and appropriate term for cotton, the natural fiber which continues to play an important role in the Indian economy. The history of the domestication of cotton is very complex and is not known exactly. Several isolated civilizations in both the Old and New World independently domesticated and converted cotton into fabric. Cotton has been spun, woven, and dyed since prehistoric times. It clothed the people of ancient India.

1.2 Raw Cotton

Cotton is a soft, fluffy staple fiber that grows in a ball, or protective capsule, around the seeds of cotton plants of the genus Gossypium. India is the only country which grows all the four species of cultivated cotton. The fiber is most often spun into yarn or thread and used to make a soft, breathable textile. India placed now as second largest cotton producing country leaving behind USA as per CAB estimates. Genetically modified (GM) cotton was developed to reduce the heavy reliance on pesticides. GM cotton acreage in India grew at a rapid rate, increasing from 50,000 hectares in 2002 to 10.6 million hectares in 2011. The total cotton area in India was 12.1 million hectares in 2011 and GM cotton was grown on 90% of the cotton area.

1.3 Spinning

Spinning is the most consolidated and technically efficient sector in India's textile industry. It is the main vertical of the cotton textile industry. It has about 3300 mills in India and produces about 12 million Kgs of yarn every day. The production of cotton yarn in India has remained relatively stable over the past 10 years. India is now the world's largest exporter, with a global market share of 25

per cent. The production of cotton yarn is a multi-step process, involving a number of different value chain players. Along this value chain, a number of players contribute to the final product. Spinning mill sector remains the most organized part of the textile industry, due to the centralized nature of the spinning activities and its sheer scale of production. Technology is central to reducing the costs of production, improving yarn and fabric quality and expanding information access along the value chain.

1.4 Weaving

Weaving is the most important process in the making of cotton cloth. In India this sector is mainly unorganized. The sector consists of fragmented, small, labour-intensive and often, un-registered units that invest low amount in technology and practices especially in the power loom, processing, handloom and knits. There are approximately 5mn looms in the country. India has 1.8mn shuttle looms which is 45 per cent of world capacity, and 3.90mn handlooms which is 85 per cent of world capacity. The sector contributes significant share in the production of cloth and generation of employment. More than 40% of the cloth that goes into exports originates from this sector. Value addition and the manufacturing of fabrics according to customer's compliances, is not possible due to obsolete technology of looms. In world share of shuttleless looms, India ranked 9th. It is one of the most promising sectors of huge employment.

1.5 Processing

The ultimate objective of processing is to produce fabric that is clean and rid of all impurities that interfere with dyeing and finishing. About 70% of India's Woven processed fabric is produced by decentralized sector, which faces investment constraints. The decentralized processing sector is highly fragmented with hand processors, semi-power processors and power processors together sharing major

portion of our textile processing activities. Wet processing of textiles is the most complex stage in the manufacturing of fabric requiring immense personal attention and knowledge having potential for true value addition. When one thinks about competitiveness in this millennium, wet processed goods must be provided with consistent quality, in large quantity, adhering to delivery schedule and with right first time performance. The key to success in textile wet processing technology will be the indication of highly trained manpower at lucrative wages in structured manner.

1.6 Garment

A significant part of the apparel export from India is dominated by Cotton garments. One of the prime reasons for garment wet processing sector's rising importance is its ability to introduce a variety of aesthetic and functional innovations. India's huge domestic market can lead the industry to greater competitiveness through economies of scale. Large retailers and branded marketers play pivotal roles along global supply chains by setting up decentralized production networks linked to developing countries and by coordinating the range of activities involved in clothing design, production, and marketing. The Indian textile and apparel industry is diversified and has the capacity to provide a wide variety of textiles to meet different market needs. India needs to improve its quality of fabrics.

1.7 Home Furnishing

The Home Furnishings Industry in India falls under the purview of the textile industry. Indian home furnishing manufacturer and home furnishing exporter offers a spectacular range of bedspreads, furnishing fabrics, curtains, rugs, durries, carpets, placemats, cushion covers, table covers, linen, kitchen accessories, made-ups, bed spreads, bath linen, and other home furnishings accessories to the world.

The market for home textiles is dominated by bed and bath linen, which have more than two-third of the market share in value terms. Bed linen alone has a market of about Rs 76 billion according to the estimates. Majority of the market is still in the unorganized sector and highly dispersed. India is the major source for garment and made ups for many global countries especially for Europe and US at low and mid price.

1.8 Value Addition

A value chain is a sequence of production, processing and marketing activities: products pass through all activities of the chain in a certain order and, with each activity, the product gains value. Value added products not only reward with considerable increase in profit but also build the brand image. Now the textile has its wider application in industry as well as in household. Cotton textile industry is buyer driven value chains in which large retailers, marketers and branded manufacturers play the pivotal roles in setting up decentralized production networks in a variety of exporting countries. It has an image of self-reliant industry with substantial value-addition which forms a major contribution to the country's economy.

1.9 Importance of Cotton Industry in Indian Economy

Cotton is the backbone of textile industry, which consumes 70% of the country’s total fibre production. This industry provides one of the most basic needs of people and holds importance, maintaining sustained growth for improving quality of life. Today the world uses more cotton than any other fiber and cotton is a leading cash crop. Being a major contributor to the GDP, employment to rural areas and to the less privileged, and as a major contributor to industrial production and export the cotton textile industry has a bigger say in the future growth of the Indian economy. Several challenges stand in the way of Indian firms before they can own a larger

share of the global market. Managing such a complex supply chain requires economies of scale and economies of scope with proper coordination through excellent managerial practices, technology, long term planning and facilitating policies.

With the above points in view, this study is taken up in cotton textile industry in India with the following specific objectives

Objectives of the Study

- To analyze the growth trend, instability and economical factors of production and marketing of cotton textile industry and various cotton textile companies in India
- To establish relationship between various economical factor of cotton textile industry with those of affecting indicators in India
- To show the future trend and prospects of Indian cotton textile
- To assess the value addition in cotton textile industry

Limitations

- Study is limited to cotton textile sector. Other textile sectors are not included.
- Global cotton statistics has not been taken into account.
- Major cotton producing states are only considered.
- No secondary data are used in processing sector.
- Woven fabric is only area of study. No knitted fabric is considered.
- Study period is limited to 31 years (1980-2011).
- Average working time is considered in companies for making study easy.
- For analyzing the data linear trend is taken.

Hypothesis

- Growth rate in area, production and productivity of cotton depends on time period.
- There exists relationship between cotton productions with time, cotton consumption with time, cotton production with cotton consumption, cotton export with time and yarn production with time.
- There is dependency of cotton export on value of export and time, cotton export on production and time, cotton consumption on production and time
- Cotton production depends on area and productivity with change in time in major cotton producing states.
- Area, production and productivity vary among different cotton producing states in India.
- There is connection between yarn production with cotton production and time. Cotton export quantity depends on production consumption, exchange rate with change in time. Cotton value of export depends on production, export quantity, exchange rate with change in time.
- Yarn production capacity differs with yarn counts and relationship exists between yarn production capacity with production cost and yarn price
- There is association between production of cotton fabric with blended fabric, others fabric, total fabric at different point of time
- Export of cotton woven fabric depends upon value of export and with time
- Import of cotton woven fabric depends upon value of import and with time
- Cost, price and profit for estimated and observed data shows variation in processing companies.
- Cost and profit for product varieties within the companies and between the companies differs.

Chapter 2

Review of Literature

This chapter describes the review of those research literatures which have been already carried out related to the present study. Few of them are given in brief.

***Omkar Goswami* (1985)** has made an analysis of demand and supply in the cotton textile industry. According to him, only the Powerloom sector and the pure spinning units seem to be doing well. ***D. C. Mathur (*1993)** in his book "Personnel Problems and Labour Welfare A study of cotton textile industry" had explained about personnel management in the cotton textile industry. **Kumar (1997)** in his article revealed the importance of cotton and thus attempted to promote cotton among other cash crops. **Santhanam and Sundaram (1997)** found that India had contributed in the global cotton statistics with the largest cropped area of 8.9 million in 1996-97, growing the most diverse cultivars in terms of botanical species and composition, producing the widest range of cotton fiber quality suitable for spinning 6's to 120's counts yarn. **Spinanger (1999)** made comparative study of clothing sector with other important sectors in terms of production, export and impact on economy. **Shetty (2001)** analyzes India's textile and apparel industry, its structural problems, market access barriers. India's apparel sector is highly fragmented and is characterized by low levels of technology use. The low level of technology has contributed to low productivity and deprived the sector of benefits of economies of scale. A limited fabric base and lack of product specialization are major weaknesses of the Indian apparel sector. **Seyam (2003)** in his paper reveals the fact that role of technology is very important for the progress in weaving industry. Companies must track the technology that is arriving in the market. According to **Hegde et al (2004),** Cotton today is the most used textile fiber in the world. It is generally recognized that most consumers

prefer cotton personal care items to those containing synthetic fibers. According to **Kundu (2004)**, cotton Textile Industry is a mega-luminous industry in India. The country accounts for about one fourth of world trade in cotton yarn. For the Indian Economy, the textile industry accounts for 20% of industrial production employing over 15 million people. 30% of India's export basket consists of textiles and garments, makes it one of the largest contributors. **Singhal (2004)** pointed out the unorganized structure of large-scale Indian textile industry. The cotton industries have one of the most complex supply chains in the world with large numbers of intermediaries between the farmer and the final consumer. **Chandra (2006)** discussed the challenges faced by the Indian textile and apparel industry. It is high time that India needs big firm which can produce standard products in large volumes as well as small and mid size firms producing large variety in small to mid size batches. **Ace Global Private Limited (2009)** conducted a market research on Indian apparel and clothing industry. Rise in disposable income and strong per capita income have considerably helped the industry to move ahead from a commodity level garment purchasing to a life style or a branded level product. **India in Business (2011)** mentioned that The Indian Textiles Industry has an overwhelming presence in the economic life of the country. Apart from providing one of the basic necessities of life, the textiles industry also plays a pivotal role through its contribution to industrial output, employment generation, and the export earnings of the country. **Netscribes (India) Pvt. Ltd. (2011)** announced that rising cost of cotton textile will boost the Man-made Fiber market in India. At this stage it is necessary to save cotton industry from viewpoint of employment generation, foreign exchange earnings etc. by adopting different latest technology.

Chapter – 3

Research Methodology

Research procedure

Research method has been divided into two components

(1) Data collection (methods and materials)

(2) Data analysis

1 Data collection

The study is based on both primary and secondary data.

Secondary data are collected from Cotton Advisory Board, Ministry of Textiles, United Stated Department of Agriculture, Directorate of Cotton development, Mumbai, National Centre for Integrated Pest Management, New Delhi, India Trade Statistics and India Export Import Statistics, Central Institute of Cotton Research, Ministry of Textile. Office of the Textile commissioner, GOI, Ministry of Textile, Economic Survey 2011-12, GOI, Monthly Statistics of Foreign Trade, India, DGCI&S, Kolkata, Central Institute of Cotton Research, Ministry of Textiles, Press Information Bureau, GOI (1993-94 to 1997-98 value of export), Economic and Industrial Publication (1992-93 to 1997-98 quantity of export), National Household Survey 2009 Market for Textile and Clothing, Textile Committee for 2010 Foreign Trade Statistics of India, DGCI&S

Primary data are collected from personal interaction and interrogation and interviews and through mail based on structured questionnaire, field assistant. Data is collected from different states of India. For raw cotton data were collected from Punjab, Haryana, Rajasthan, Gujarat, Maharashtra, Madhya Pradesh, Andhra Pradesh, Karnataka and Tamilnadu.

Other data were collected from manufacturers and exporters of various companies in Rajasthan (Bhilwara), Gujarat (Vapi and ahmadabad), Pantnagar (Uttrakhand) and Maharashtra (Dhule and Mumbai) were the places of data collection Gujarat (Vapi), Karnataka (bangalotre), Nagpur (Ramtek), Hyderabad (pathancheru), Tamilnadu (Erode and Tirupur), West Bengal (Kolkata), Madhya Pradesh (Indore), Rajasthan (Jaipur) Andhra Pradesh (Secunderabad), Uttar Pradesh (Noida).

Primary survey was conducted to assess the market structure, size, and growth trends of different sector in cotton textile industry in India. Some data are generated from primary data. It is pertinent to highlight here that although most of the respondents were cooperative, some shared only part of the information. In such cases, effort has been made to compile as much information as possible from secondary sources.

Study Period

The study period has been taken from 1980-81 to 2010-11.

2 Data Analysis

To fulfill the objectives of study different following statistical tools have been used

2.1 Coefficient of Variation

To analyze the instability coefficient of variation (CV) has been used by the formula

$$CV = \sigma/\mu \times 100$$

where σ = standard deviation and μ = mean

2.2 Compound Growth Rate

To show the growth trend compound growth rate is calculated and shown below. For this purpose, two different models are considered.

Model- I

$$Z_t = a + bT$$

Where Z_t = area, production or productivity, a = parameter, b = regression coefficient and T = time element.

Model- II

$$X_a = mn^a$$

$$\text{Log } X_a = \text{Log } m + a \log n$$

$$n = 1 + r/100$$

where X_a = area, production and productivity, a = time element, m = intercept and r = regression coefficient.

$$\text{CGR (r)} = (\text{antilog } n - 1) \times 100$$

$$\text{where } n = 1 + r/100$$

Student's t test is used to test the significance of the CGR. Test statistics can be calculated by using t-test as:

$$t = r\sqrt{\frac{n-2}{1-r^2}}$$

where (n - 2) is the degree of freedom and r is the correlation coefficient.

2.3 Correlation Coefficient

To show the relationship between two variables Karl Pearson's correlation coefficient is calculated using the formula

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2] * [n\sum y^2 - (\sum y)^2]}}$$

where n = number of pairs of scores, $\sum xy$ = sum of the products of paired scores, $\sum x$ = sum of x scores, $\sum y$ = sum of y scores, $\sum x^2$ = sum of squared x scores, $\sum y^2$ = sum of squared y scores

Student's t test is used to test significance level of correlation coefficient. Formula used for t-test is as below:

$$t = r\sqrt{\frac{n-2}{1-r^2}}$$

where (n - 2) is the degree of freedom and r is the correlation coefficient.

2.4 Multiple Correlation Coefficient

To show the relationship between the dependent variable and those independent variables multiple correlation has been used. The formula for multiple correlation is denoted by

$$R_{z,\,xy} = \sqrt{\frac{r_{xz}^2 + r_{yz}^2 - 2r_{xz}\,r_{yz}\,r_{xy}}{1 - r_{xy}^2}}$$

where x and y are independent variable and z is dependent variable, r is correlation coefficient.

Fisher's F test is used to test significance level of multiple correlation coefficient. Formula used for F-test is given as below:

$$F = \frac{R_{y.12\ldots k}^2 / k}{(1 - R_{y.12\ldots k}^2)/(N-k-1)},\quad df = k,\ N-k-1$$

2.5 Return on Investment

To find out return on investment following formula is used

$$\frac{\text{Price/unit}}{\text{Cost/unit}} \times 100$$

2.6 Production Utilization

To find out production utilization, formula used is

$$\frac{\text{Observed capacity}}{\text{Estimated capacity}} \times 100$$

2.7 Cost Share

To calculate the cost share (%) of production factors the formula is

$$\frac{\text{Cost of factor of production}}{\text{Total cost for all factor of production}} \times 100$$

2.8 Coefficient of Determination

To show the relationship between two variables coefficient of determination is calculated using the formula

$$r^2 = \frac{\{n(\square xy) - (\square x)(\square y)\}^2}{[n\square x^2 - (\square x)^2] * [\square\ n\square y^2 - (\square y)^2]}$$

where n = number of pairs of scores, $\sum xy$ = sum of the products of paired scores, $\sum x$ = sum of x scores, $\sum y$ = sum of y scores, $\sum x^2$ = sum of squared x scores, $\sum y^2$ = sum of squared y scores

Student's t test is used to test the significance level of coefficient of determination. Formula used for t-test is

$$t = r\sqrt{\frac{n-2}{1-r^2}}$$

where (n - 2) is the degree of freedom and r is the correlation coefficient.

2.9 Coefficient of Alienation

To show the non relationship between two variables coefficient of alienation is calculated using the formula

$$K = 1 - \frac{\{n(\square xy) - (\square x)(\square y)\}^2}{[n\square x^2 - (\square x)^2] * [\square\ n\square y^2 - (\square y)^2]}$$

where n = number of pairs of scores, $\sum xy$ = sum of the products of paired scores, $\sum x$ = sum of x scores, $\sum y$ = sum of y scores, $\sum x^2$ = sum of squared x scores, $\sum y^2$ = sum of squared y scores

Student's t test is used to test the significance level of coefficient of determination. Formula used for t-test is

$$t = r\sqrt{\frac{n-2}{1-r^2}}$$

where (n - 2) is the degree of freedom and r is the correlation coefficient.

2.10 Net Return

$$\frac{Profit}{Cost} \times 100$$

2.11 Paired Test

For comparing two related samples involving small values of n that does not require the variances of two populations to be equal, paired test is used by the formula

$$\sigma_{diff} = \frac{\sum D_i^2 - (\bar{D})^2 \times n}{n-1}$$

where $\bar{D}$ = mean of differences, σ_{diff} = standard deviation of differences, n = number of matched pairs with n – 1 degree of freedom

2.12 Hypothesis Testing

To show the cost comparison between small and big companies following testing has been used

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{(n_1 - 1)\,\sigma_{S1}{}^2 + (n_2 - 1)\,\sigma_{S2}{}^2 \times (\frac{1}{n_1} + \frac{1}{n_2})}}$$

where X_1, n_1, σ_{S1} represents different cost factors, number of sample and standard deviation respectively of large companies and X_2, n_2, σ_{S2} signifies cost factors, number of sample and standard deviation of small companies respectively in processing industries.

2.13 Linear Programming Problem

This method is used to optimize the resources in order to achieve objective of the organization

Maximize or minimize $Z = \sum_{j=1}^{n} c_j x_j$

subject to $Z = \sum_{j=1}^{n} a_{ij} x_j \ (\leq, =, \geq) b_i, \quad i=1,2,\ldots,m$

and $x_j \geq 0, j = 1,2,\ldots,n$

where variables x_j (j = 1,2,…,n) are called decision variables, c_j, a_{ij} and b_i (i = 1,2,…,m); j = (1, 2,…,n) are constants determined from the statement of the problem. The constants c_j represent the net unit contribution of decision variables x_j to the value of the objective function and are called objective function coefficients, constants b_i denote the total availability of the ith resource and are called stipulations and constants a_{ij} stand for the amount of resource, say i consumed per unit of variable (activity) x_j and are called structural coefficients.

2.14 One Way ANOVA

For determining variance of cost/profit between the product varieties by companies, one-way Anova is used.

Source of variation	Sum of square (SS)	Degree of freedom(d.f.)	Mean square (MS)	F-ratio
Between samples	$n_1(X_1 - \bar{\bar{X}})^2 + \ldots + n_k(X_k - \bar{\bar{X}})^2$	(k-1)	$\frac{SS\ between}{(k-1)}$	$\frac{MS\ between}{MS\ within}$
Within samples	$\square(X_{1i} - \bar{X}_1)^2 + \ldots + \square(X_{ki} - \bar{X}_k)^2$	(n-k)	$\frac{SS\ within}{(k-1)}$	
	i = 1, 2,3…			
Total	$\square\ (X_{1j} - \bar{\bar{X}})^2$ i = 1, 2... j = 1, 2…	(n-1)		

2.15 Time Series Analysis

To find out the future trend for various sector in cotton textile industry following trend equations have been used.

2.15.1 Linear Equation

$$y = a + bx$$

$$\sum y = Na + b\sum x$$

$$\sum xy = a\sum x + b\sum x^2$$

2.15.2 Quadratic Equation

$$y = a + bx + cx^2$$

where y is demand data and x is time data (no of years), a and b are constant

2.15.3 Exponential Function

$$P = Ar^t$$

where A and r are parameters and t is the time period

2.16 Multiple Regression Model

For predicting the performance on yarn export (Y), information of yarn production (X_1), domestic consumption of yarn (X_2), and exchange rate (X_3) have been used. A multiple regression equation for predicting Y can be expressed as follows:

$$Y = b_1X_1 + b_2X_2 + b_3X_3 + u$$

2.17 Graph (Bar diagram, Pie Chart and Line Chart)

To show the cotton export and import in India from 2000-01 to 2010-11 line diagram has been used. For the same period balance of trade of raw cotton has been shown using bar diagram. Line diagram has been used to depict the growth trend of cotton production, consumption and export during 1980-81 to 2010-11. Total production, average cost and net return (%) for weaving companies have been shown. Net return ratio for processed fabric in different companies is shown.

Chapter – 4

Results and Discussion

Study period is divided into four parts. First, second and third part is from 1980-81 to 1989-1990, 1990-91 to 1999-2000 and 2000-01 to 2010-11 respectively. Fourth period 1980-81 to 2010-11 is considered for all the period taken together.

Findings

- Increase in area from 1980-81 to 2010-11 is 7.82 M ha to 11.14 M ha which is only 1.4 folds. Cotton production in 1980-81 is 1.2 Mt against 5.52 Mt in 2010-11 which is 4.6 folds. Productivity increased from 0.152 t/ha in 1980-81 to 0. 516 t/ha in 2010-11 which is 3.4 folds.
- Fluctuation in area is more prominent during the 2nd period compared to 1st and 3rd period. Highest instability in area is observed in period 4. Instability in production has decreased by 40% in period 2 as compared to period 1. For the same period the instability in productivity has decreased by 27.5%.
- The instability for production and productivity has increased by 287% and 76% respectively in period 3 compared to period 2. The fluctuation (Coefficient of variation) for production during period 4 is observed to be 49.27% while CV for productivity is observed to be 43.8% for the same period. Instability of production and productivity is prominent during the 4th period.
- Growth rate for area is highest in period 2 with 6.88. Production and productivity are highest in period 3 and period 4 with 16.06 and 12.38 respectively.
- During period 1, correlation coefficient between year and export is found to be non effective. There is no correlation exists between production and export at -0.078. Correlation coefficient (r) between year and consumption is

0.956, which indicates a positive high degree of Correlation coefficient between year and consumption. Correlation coefficient (r) between production and consumption at 0.544 shows a moderate degree of correlation between them. For period 2, there is no association between year and export at correlation coefficient -0.579. Same condition holds for production and export with no correlation at 0.117. There is positive relation between year and consumption with correlation coefficient 0.56. Correlation coefficient between production and consumption is moderate at 0.569. In period 3 the coefficient of correlation (r) between year and export is computed as 0.761, showing a high degree of correlation between them. As observed the correlation coefficient (r) between production and export is 0.839 which says that a high degree of correlation exists between them. The coefficient of correlation (r) between year and consumption is computed as 0.934, showing a very high degree of correlation between them explaining a significant level of relation between export and consumption. The coefficient of correlation (r) between production and consumption is 0.935 explaining a high degree of correlation showing a significant association between the variables during the period of study. Period 4 is largely influenced by period 3 showing clear that correlation coefficient between the variables is highly correlated.

- In period I highest instability and lowest instability for area is seen in Karnataka (value is 29.064) and Maharashtra (value is 2.367) respectively. Andhra Pradesh shows the highest fluctuation in area at 24.354 for period II. For the same period Karnataka at 7.5 shows the lowest value. Tamilnadu and Madhya Pradesh for period III at 29.338 and 7.392 shows the maximum and minimum instability in area respectively. In period IV area for Andhra Pradesh at 39.151 and Maharashtra at 11.04 shows the highest and lowest

fluctuation respectively. Highest fluctuation in production is observed in Madhya Pradesh at 47.15 during period I. For the same period lowest fluctuation is observed in Maharashtra at 19.967. In period II highest and lowest fluctuation in production is noticed in Punjab (42.78) and Tamilnadu (6.742) respectively. In period III Gujarat shows the highest instability at 45.822 while Madhya Pradesh at 8.729 shows the lowest instability. There is very high instability in production in Gujarat at values 85.238 and lowest instability at 24.498 is observed in Tamilnadu in period IV. Maximum variation in productivity is seen in Madhya Pradesh at 42.573 and lowest variation is seen in Haryana at 15.84 in period I. Highest and Least variation in productivity for period II is observed in Punjab at 39.11 and Rajasthan at 10.462 respectively. Maharashtra has the greatest instability for both period III and IV at 34.513 and 55.439 in productivity respectively. Lowest fluctuation in productivity is observed in Madhya Pradesh at 12.149 in period III and Rajasthan at 30.611 in period IV.

- Correlation coefficient between year and yarn production is highest at 0.968 during 1980-81 to 1989-90. Instability of cotton yarn count for 1-30s is high at 23.477 during period 2 and highest in period 4 at 38.97. For 31-40s, 41-80s and 81s and above fluctuation is greater in period 1. Greatest instability for all the yarn count has been observed in period 1. Very high correlation exists between year, cotton production and yarn production is 0.96 in period 3.
- In 1993-94 to 2010-11there is very high correlation between year and yarn production at 0.919, year and yarn consumption 0.947, yarn production and yarn consumption at 0.984, yarn production and value of export at 0.914. High correlation exists between year and exchange rate at 0.767, year and value of export at 0.823, yarn consumption and value of export at 0.858.

- There is extremely high correlation between year, yarn production and yarn consumption at 0.98, yarn production, export quantity and value of export at 0.96, year, export quantity and exchange rate at 0.88. High correlation observed between year, exchange rate and value of export at 0.82, Quantity of yarn export, value of export and exchange rate at 0.84. Moderate relation seen year, yarn consumption and export quantity at 0.66, year, yarn production, export quantity at 0.67, year, yarn production and value of export at 0.67, year, export quantity and value of export at 0.61. There is high correlation between capacity, cost/ton, and profit/ton at 0.741 for various spinning companies.
- There is very high correlation between year and fabric production at 0.961 in period 4, year and blended fabric at 0.978 in period 2, year and others fabric production at 0.987 in period 3, year and total fabric production at 0.991 at period 4, production of cotton fabric and blended fabric at 0.929 in period 4, production of cotton fabric and others fabric at 0.973 in period 1, production of cotton fabric and total fabric production at 0.994 in period 1, production of blended fabric and others fabric at 0.979 in period 2, production of blended fabric and total fabric at 0.983 in period 2.
- Correlation coefficient and coefficient of alienation between year and value of import of cotton woven fabric for 1999-2009 is 0.903 and 0.43 respectively. Coefficient of alienation and correlation coefficient between year and value of export of cotton woven fabric is 0.99 and 0.035 respectively.
- Production utilization for 108 (%) while it is 63 (%) for Jay Balaji Dyeing. Average return ratio for Suryalaxmi cotton mills is 60(%) whereas it is 17.43(%) for JKT.

- An extremely high relationship between year and export value of readymade goods is observed at 0.955 in 2002-2010. During 2002-2010 year and export of readymade goods also shows high correlation between at 0.897. Good correlation exists for 2002-2010 between year and export value of madeups at 0.729, export of madeups and value at 0.698. Moderate relation shows between year and export of madeups at 0.595.
- High instability is seen between year and export quantity, of readymade goods at 64.82, year and import quantity at 79.9 for 2002-2010.
- Calculated value of F-ratio for cost and profit for home furnishing companies is 4.22 and 4.99 respectively. The values are less than the table value of 8.66 at 5% level with degree of freedom being 3 and 20 respectively. It can be inferred from the fact that with product varieties within the companies the cost and profit remains insignificant and is just a matter of chance.
- In spinning share of cotton and auxiliary material is largest, in weaving share of human resource cost is more, in processing chemical cost is major, in garment and home furnishing sector share of fabric cost is highest.
- Depending upon the resource constraint the objectives of garment companies varies either as cost minimization or profit maximization. Research and development is very important in garment units in order to provide exclusive designs and fitness.
- A company going for value added and unique product earns more. For increase in extra revenue for value added product is high or very high compared to extra cost incurred for value addition.

Chapter – 5

Conclusion and recommendation for future research

5.1 Conclusion

- There is no significant change in cotton area in 31 (1980-81 to 2010-11) years while cotton production and productivity has increased to 4.6 and 3.4 times respectively.
- Highest instability is observed for production during 1980-81 to 2010-11 compared to area and productivity.
- A slight increase in area and remarkable increase in productivity has contributed to the production of cotton for the year 1980-81 to 2010-11.
- Noteworthy boost in production during 2000-01 to 2010-11 is due to introduction of Bt cotton.
- During 2000-01 to 2010-11, production, consumption and export of cotton has increased which explains that with increase in domestic consumption cotton is moving to value chain and export of cotton means earnings of foreign exchange.
- Period 1 and 3 shows highest instability in area for Karnataka and Tamilnadu respectively and for period 2 and 4 Andhra Pradesh shows the highest instability. Highest and lowest instability in area is observed in Karnataka and Maharashtra in 1980-81 to 1989-90.
- Madhya Pradesh and Punjab shows the greatest instability for production and productivity in period 1 and 2.
- Gujarat shows the greatest fluctuation for period 3 and 4. Maharashtra shows the highest instability for productivity during 3 and 4 periods.
- During 1980-81 to 1989-90 increase in productivity in Punjab, Madhya Pradesh and Tamilnadu has contributed to increase in production.

- In 1980-81 to 1989-90 cotton production has increased in Andhra Pradesh due to increase in cotton area.
- Production has increased in Gujarat and Maharashtra due to boost in area for period 2.
- High growth rate in area has contributed to increase in production inspite of decrease in productivity in Rajasthan and Andhra Pradesh.
- Inspite of decrease in area production has increased in Haryana due to very high growth rate in productivity in period 3.
- During period 3 Gujarat shows very high growth rate in production due to extremely high increase in area and high increase in productivity. Same trend has been observed for Maharashtra where contribution of productivity is more than area.
- Andhra Pradesh in period 3 also has very high growth rate in production where both the area and productivity has almost same contribution.
- Gujarat, Maharashtra and Andhra Pradesh shows high growth rate in production which has been contributed both by area as well as productivity.
- There is increase in yarn production over a period of time but there is no as such rise in quality yarn count which has remained stagnant.
- Export of yarn mainly depends on domestic consumption and exchange rate. Yarn export suffers because of yarn quality. Due to yarn quality India is not getting good returns from yarn export.
- Share of cotton yarn count compared to blended and manmade after 1996 has not changed in true sense.
- Cotton fabric production has risen since 1980 but between 1991 to 2001 blended and non cotton fabric have dominated the cotton fabric. This can be attributed to the fact that cotton production reduced and there was import of

cotton from other countries during the period. Besides cost of production and price of cotton fabric is more compared to other types of fabric.

- Per capita availability of cotton cloth has increased two times whereas share of others have increased five times from 1980 – 2010. During 1980s share of per capita availability of cotton cloth to others fabric is 75 to 25 percentages whereas in 2010 share seems to be equal. In this context it can be concluded that proper strategy making should be adopted to increase the production of cotton fabric at competitive price.
- There is no major change in export quantity and its value of fabric after 2005. It can be infer from the fact that fabric goes for value addition to next stage of processing and so on.
- It is observed that rate of returns from small weaving sector is more compared to medium and large sector. The policy of Indian government plays a major role in it by supporting the small sectors with the aim of supporting the traditional weaver class by providing incentives to the small sector.
- When the question of export arises quality is major concern. Small sector is incapable of meet the demand of international market due to capital and skill constraint, improper marketing strategy. Large and medium scales are deprived of government support and are unable to avail facilities and as a result they are not able to perform well. In India this sector still remains as a scattered and unorganized sector.
- Returns from printing is lucrative than dyeing as printing is a value added product than dyeing. Wider width generates four times more profit than narrow width of different quality. Profit from Processing of designer ladies wears fabric and shirting fabric is more.

- There is not much variation in average returns from processing in different companies due to proper selection of product mix.
- In garment industry highly skilled labour is required. Labour requirement varies time to time due to large product varieties and demand fluctuation. Job insecurity is highest in this sector.
- After 2004-05 removal of MFA (multifibre agreement) export quantity and value of readymade goods and madeups has increased but in 2007-08 due to recession exchange rate got reduced and consequently the export value reduced.
- With product varieties in home furnishing within the companies the cost and profit remains insignificant and is just a matter of chance.
- Study shows companies incurring more cost in labour earn more profit which reveals that skilled labours are employed generating value added product.
- Cotton and yarn prices are more or less stable while price of greige fabric to garment or home furnishing are inflexible depending upon the fashion, demand, brand etc.
- Pricing strategy highly depends upon demand in garment sector. It can add value in numerous ways. Brand is very important as it creates its own demand.
- Due to different objectives, profit and cost structure of Garment Company varies.
- Garment market is highly fluctuating. Demand for products is unpredictable as it is highly fashion oriented. On the other hand home furnishing market is comparatively stable. In India after 2000 many large companies have come

up in home furnishing industry and supplying high valued product in bulk and thus earning good profit.

- The value generates from cotton to yarn 3 to 6 times, from cotton to greige fabric 5 to 10 times, cotton to processed fabric 8 to 16 times and more, cotton to garment 12-28 times and from cotton to home furnishing 16 to 24 times.
- Due to cheap labour availability for garment in south east asian countries like Bangladesh, Pakistan, Sri Lanka, Thailand etc. are in advantageous position. So they can supply products in competitive price while India faces a stiff competition from these competitors.
- It is high time for India to make its own brand to create demand in the market for cotton product. Without brand there will not be good returns.
- Companies going for volume production generally reduces the average cost
- Companies with composite unit reduce per unit cost compared to single unit.

5.2 Recommendation

- Indian farmers incur loss for not getting proper price for cotton. Contract farming is a good option for getting minimum support price to minimize the risk.
- Government should take proper pricing strategy to support cotton farmers by promoting cotton besides other crop.
- Agriculture extension programme designed for the cotton farmers needs to be more effective and suitable crop management is required.
- To increase cotton production horizontal expansion of area is not an alternative option as other crops are also in priority list. Cotton productivity has to increase in order to augment overall production.

- For efficient value addition overall supply chain has to be strong starting from the raw cotton to final or finished product.
- Yarn production increases over time in India. Production utilization of spindles is also (85-90) %. But yarn of higher count lags far behind the other counts. Besides volume technology ungradation and enhancement of value addition is mandatory to match international demand.
- Spinning industry invest huge amount of fixed cost in spindles as these are imported. If India could have strong base in research and development it would have manufactured spindles domestically and fixed cost would have been reduced. Thus earning can be increased.
- Weaving in India is still dominated by small scale industry. Small scale sector has high artistic skill but lacks capital, technology, and management. As a result this sector suffers for unable to supply market demand as per the volume, timely delivery and quality. These deficiencies have to be removed to make weaving industry competitive in long run.
- After agriculture weaving generates highest employment. If this sector is spread to other regions then more employment can be generated.
- Majority of the weaving sector is unorganized and conventional and lacks modernization. So financial aid should be provided in order to promote the sector.
- Almost 32 industries are depended upon weaving sector. So if this sector can be improved it can develop these industries and earnings of Indian economy can be boosted.
- There are diverse distribution channel involved in weaving supply chain and hence these channels take away their share leaving a meager share for weavers.

- Processing sector varies from hand processing to semi automatic to ultra modern machineries thus product quality ranges is vast starting from high value added to mediocre. India is having more numbers of traditional machineries than modern. Energy consumption (water, electricity, fuel) of traditional machinery is more compared to modern one. As a result considerable amount of energy is wasted and polluted. Water especially clean water which is very important for agriculture used in wet processing. At this step water gets polluted and agriculture sector suffers for want of clean water. It is vital that recycling of water should be done so that water can be used in agriculture as well as in processing.
- Capacity planning of processing capacity is important. As a result in India there is inconsistency between demand and production in processing sector. Consequently this sector suffers from high cost, under utilization of capacity, and unable to meet customer demand.
- India needs to come up with appropriate production strategy so that it can go for product varieties to fulfill the demands of greater market share.
- Research and development (R&D) of small processing unit is either not developed or does not exist. So quality control is a major issue in these units. So companies face the problem of not processing the product at right first time and so damage or wastage is more results in increasing cost and thus delays in delivery. India loses the valuable customers and profit. It is imperative for India to emphasize on R&D in order to remain competitive in market.
- Cotton textile sector is highly labour oriented and depends upon the labour skill. But India is still behind in skilled labour. Special attention has to be

given to train labour in order to make them skillful so that proper utilization of resources can be done.

- Domestic market for processing and garment segment is mostly seasonal. The market demand for these products is not stable throughout the year. So demand forecasting has to be accurate in order to supply product at the time when it is needed by the customers.
- Garment is the only industry that is self-sufficient and complete in cotton value chain- producing everything from fibres to the highest value added finished product of garments. Its growth and vitality therefore has critical bearings on the Indian economy at large. But India being failed to create brand is unable to recognize in an international market.
- India's share in garment product is (3-4) % in global market. To increase its earnings India needs to increase its share worldwide. For this strong resource base has to be developed by India. India has to develop product varieties so as to penetrate in the foreign market.
- Garment industry competes on vast pool of skilled workers, flexible production systems, and a dynamic entrepreneurship with vibrant design creativity. India requires adopting all these strategies to endure in the long run.
- Home furnishing sector competes on high quality and volume but India being unorganized and scattered in weaving sector is unable to supply superior quality and rejection percentage is high and lacks volume. As a result this sector suffers and loses earnings.
- All over world with increase in service sector especially hospital sector demand for home furnishing also increases. At this stage India needs to adopt strong steps to be competitive in this unit. Weaving sector needs to be

more organized and consolidated. To increase volume from cotton production to processing proper management is required.

- India is having 6% organized and 94% unorganized weaving sector. Home furnishing market is huge and soaring. There is high prospect for India to capture this market.
- Weaving sector is another area of high value addition and high profit can be earned. In this regard investment in research and development is mandatory.
- High craftsmanship and artistic nature of Indian weaving sector is unique and highly commendable. But this has to be supported by modern technology and skill has to be trained to match market demand.
- Income of people increases so it makes them to afford highly value added home furnishing product. With increase in real estate demand for home furnishing is also increases.
- Market segmentation according to product varieties is required. Quality, quantity and price are the important factors that need to be researched and analyzed more intensively.
- Value addition can be achieved by converting customer's need into product
- Government should support, form different models and provide financial and monetary incentives to cotton textile sector for its growth and development.
- Skill enhancement, research and development, cluster formation are the important criteria for attaining value addition.
- Value addition is not a single step function. To add value to the product value chain has to be understood starting from raw cotton to finished product.

Paper publication and presentation

Publication

'Instability and Relative Growth Trend Analysis of Area, Production and Productivity of Cotton Crop in India', International Journal of Agricultural Economics and Management, vol.3, No. 2 (2013) ISSN: 2277-3215

Presentation

'The Supply Chain Dilemma and Prospects in Indian Cotton Industry' presented in Transilience – 2012 organized by Shri Shankaracharya Institute of Technology and Management, Bhilai

'Organic Cotton – Sustainable and Safe Future for Society', presented in Shastrarth-2013 organized by Rungta College of Engineering and Technology, Bhilai

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